REMARKS

Applicant wants to thank the Examiner for the cordial and productive interview on June 17, 2004 at the USPTO.

Claims 1, 3-6, 10-11, and 14-17 are pending and stand rejected.

Claims 16 and 17 have been amended to match the percentages in Claim 1.

Claims 1, 16, and 17 have been amended to substitute the term "micrometers" for the symbol for the same, in order to avoid possible confusion.

Summary of Invention:

Applicant's invention relates to polymeric articles having a textured surface and a frosted appearance. To have a frosted appearance, the minimum opacity number should be about 10%. The loading of the beads and mismatch of refractive index between the beads and matrix material affects the hiding power, especially the refractive index mismatch (page 14, lines 1-6). The refractive index difference between the particles and the matrix is such that light is slightly diffused to produce a frosted appearance, but not bent enough to produce an opaque appearance. Surface roughness is related to the size of the particles. If the particles size is too small, the surface of the material will be smooth. If it is too large, the large particles will form gels and lead to a poor appearance. The surface roughness produces the mar-resistant property (no fingerprints and other mar) that has made this material such a commercial success. The composition is useful for lighting, signs, shower doors and office doors.

35 U.S.C. §103(a)

Claims 1, 3-6, 10-11 and 14-17 stand rejected under U.S.C. §103(a) as being unpatentable over Hennig, et al., US Patent Number 4,876,311 in view of Carson et al, US Patent Number 5,321,056.

Hennig:

The Hennig reference describes an opaque synthetic resin made of a polymer (PMMA) matrix containing beads and useful for light projection screens and particular television projection screens. The Hennig reference fails to teach or suggest all of Applicant's claim limitations as amended, and therefore fails to present a prima facie case of obviousness under 35 U.S.C.§103.

Specifically, the Hennig reference fails to teach or suggest:

a) a particle size distribution between 10 and 110 micrometers;

b) a minimum surface roughness of 0.5 to 30;

c) a frosted appearance.

Further, The Hennig reference teaches away from Applicant's claims by teaching:

d) a preferred average particle size of from 20 – 35 microns;

e) a level of styrene monomer in the beads of 40 percent in all Examples;

f) a preferred difference in Refractive Index of greater than 0.04;

g) a loading 3.5 percent beads.

a) The Hennig reference fails to teach or suggest a particle size distribution between 10 and 110 micrometers. The Hennig reference is silent on particle size distribution. The particle size distribution claimed by Applicant is important for providing the claimed textured surface. The relatively narrow particle size distribution also is required to produce the claimed frosted appearance. A Beckman Coulter particle size analysis of the beads used in Applicant's Examples is attached. The narrow particle size distribution required for the invention is difficult to obtain. Applicant company has a granted US patent (US 5,733,992) for producing material having the similar particle size distribution. Particle sizes less than those claimed by Applicant produce a non-textured surface. If the particle size distribution includes particles larger than 110 micrometers, these particles will produce visible gels seen as surface defects in the final product

b) The Hennig reference fails to teach or suggest a minimum surface roughness of 0.5 to 30. The Hennig reference is silent on surface roughness, while this is a required element of Applicant's claim. An objective of the Hennig reference is to provide an opaque solid synthetic resin suitable for use as light projection screens (col. 2, lines 46 and 47). The surface roughness required by applicant would be unsuitable for the Hennig projection screen, since light would diffuse or be scattered. Applicant has entered into the record a sample of PMMA material made using the Hennig bead composition, having an average particle size of 38 microns, and with a 30 percent loading. One can observe and feel the lack of surface roughness, especially when compared to a sample made according to Applicant's Example V.

c) The Hennig reference fails to teach or suggest a frosted appearance. A frosted appearance is achieved in large part due to the difference in Refractive Indexes between the matrix polymer and the polymer beads. A frosted appearance, as defined in WordNet® 2.0, ©2003 Princeton University (attached) means "having a roughened coating resembling frost." The difference in the refractive index of the particles relative to the matrix material determines the extent to which light will be diffused at the interface between the particles and matrix. Applicant has found that a refractive index difference between the particles and matrix is preferably greater than 0.02 for the frosted appearance. However, if the refractive index difference is too great, light will be diffused and scattered too much, resulting in an opaque material. In the comparative experiments, added by both the previous Declaration and the present Declaration, it can be seen that the compositions of the Hennig reference, having a high level of styrene (40 %) in the beads, producing poor Total White Light Transmission (TWLT) of 17, 22 and 24%. These materials are opaque and not frosted, therefore unsatisfactory in the applications for which Applicant's invention is intended.

d) The Hennig reference teaches away from Applicant's claims by teaching a preferred average particle size of from 20 – 35 microns (col 3, line 7). Applicant claims a mean particle size of from 35 to 70 microns. One skilled in the art would not be motivated by a preferred range of less than 35 microns, to practice Applicant's claims requiring particles of 35 microns or greater. The larger particle size is needed in Applicant's application to produce surface roughness. The smaller particle size preferred by Hennig would not produce the surface roughness claimed by Applicant. One of skill in the art would have no motivation from the Hennig reference to use particles with a mean particle size of 35 to 70 microns, as claimed by Applicant.

e) The Hennig reference teaches away from Applicant's claims by teaching a level of styrene monomer in the beads of 40 percent in Example 1. Hennig provides only one working example of the invention, and that uses beads having 40 percent of styrene and 60 percent methymethacrylate. One skilled in the art would not be motivated by the teaching of 40 percent styrene, to practice Applicant's claim requiring 15 to 35 % styrene. A 40 percent styrene particle would have a refractive index difference from the PMMA matix of 0.04, which would produce an opaque material.

f) The Hennig reference teaches away from Applicant's claims by teaching a preferred difference in Refractive Index of greater than 0.04 (column 5, line 68). Applicant has found that a refractive index difference between the particles and matrix is preferably greater than 0.02 for the frosted appearance. However, if the refractive index difference is too great, light will be diffused and scattered too much, resulting in an opaque material. The Hennig reference and example teaches a refractive index difference of 0.04, which produces an opaque object – rather than the frosted appearance required by Applicant's claims.

g) The Hennig reference teaches away from Applicant's claims by teaching a Loading of 3.5 percent beads in Example 2. In Applicant's claim 6, a loading of 5 to 60 percent of particles is required. Hennig exemplifies only a loading of only 3.5 percent was used. One of skill in the art would not be motivated by a teaching of only 3.5 percent, to practice Applicant's claim of 5 to 60 percent.

The Hennig Example, producing a light transmission of 87-89 percent, does not meet the generally accepted criteria of opaqueness, and thus is misleading. A generally accepted definition of an opaque material is "a medium impervious to rays of light, that is, not transparent to the human eye", McGraw-Hill Dictionary of Scientific and Technical Terms, Third Edition, 1984 (attached). Eight other definitions, found on Dictionary.com (attached) echo a similar definition of opaque namely that it means impenetrable to light, neither transparent nor translucent. One of skill in the art would be confused by the Hennig reference which claims an opaque resin, yet exemplifies a resin having a transmission of 87-89%.

Carson

The Carson reference is cited as a secondary reference to show that the composition of copolymer particles impacts the refractive index. While Applicant agrees that the composition of the copolymer determines the refractive index, there is no teaching in the Carson reference to overcome the deficiency of the Hennig reference in selecting a copolymer composition/matrix combination producing a refractive index difference to produce a frosted appearance (Applicant's claim) rather than an opaque appearance as taught by Hennig.

Hennig et al. in view of Carson, further evidenced by Minghetti

Claim 15 stands rejected as above, further evidence by Minghetti. The Minghetti reference is a secondary reference to show that a colorant may be added to the resin. The Minghetti reference fails to correct the defects of the Hennig in presenting a *prima facie* case of obviousness, as stated above.

Commercial Success

Commercial success is a secondary consideration that may help obligate an obviousness rejection. The present claims relate to ATOFINA commercial frosted products. The textured surface has been found to provide excellent mar-resistance, especially to fingerprints and other surface marring effects. The mar-resistance and frosted appearance have allowed the product to become a preferred material for point-of purchase displays, shower enclosure, and other surfaces. Sales of the material over the past 3 years have topped $5 million dollars. The sales are a measure of the product of Applicant's claims meeting a long felt need, that was not met by other materials – such as the material of the Hennig reference which was described for use as a projection screen.

Declaration and Samples

Applicant is submitting a second Declaration, in response to the Examiner's criticism of the data in our first Declaration, containing an example using the composition described in Hennig's Example. Applicant is also submitting a sample of the Hennig composition material as well as to samples of Applicant's Example V, and commercial product into the record.

Sample 1: Applicant has remade the Hennig Example 1, with a particle size of 38 microns. When compounded at a 30 percent loading into a PMMA matrix, a TWLT of only 17.7% was found. This opaque material would be outside of Applicant's claimed properties, and would not produce the frosted effect claimed by Applicant. Also, the particle size and distribution of the Hennig material fails to produce the textured effect and roughness required in Applicant's claims.

Samples 2 and 3: Are commercial-type samples based on Applicant's claims. Sample 2 is FST-20 from Applicant's Example 5. Sample 3 is the same composition beads, with a 40% bead loading. As can be seen and felt, Samples 2 and 3 have a rough texture, and have the frosted look described by the criteria of Applicant's claims

In view of the above, Applicant believes that the reasons for rejection have been overcome, and the claims, as amended herein, should be allowable to the Applicant. Accordingly, reconsideration and allowance are requested.

Respectfully submitted,

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